
FAA AVIATION NEWS
DECEMBER 1966

COVER

This vintage **Cub** seaplane, hibernating for the winter, will accumulate ice while safely anchored to the ground. Not so with planes which regularly fly the wintry skies. While icing is possible at any time of the year, it is more prevalent in winter. For details see "Icing: The Cold Facts," starting on page 8.

FAA AVIATION NEWS

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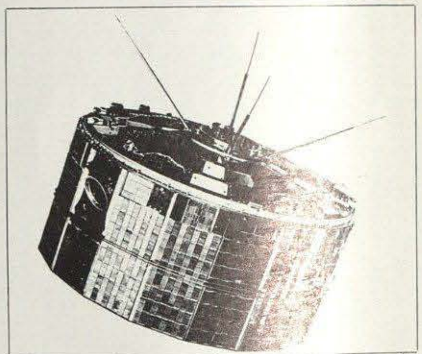

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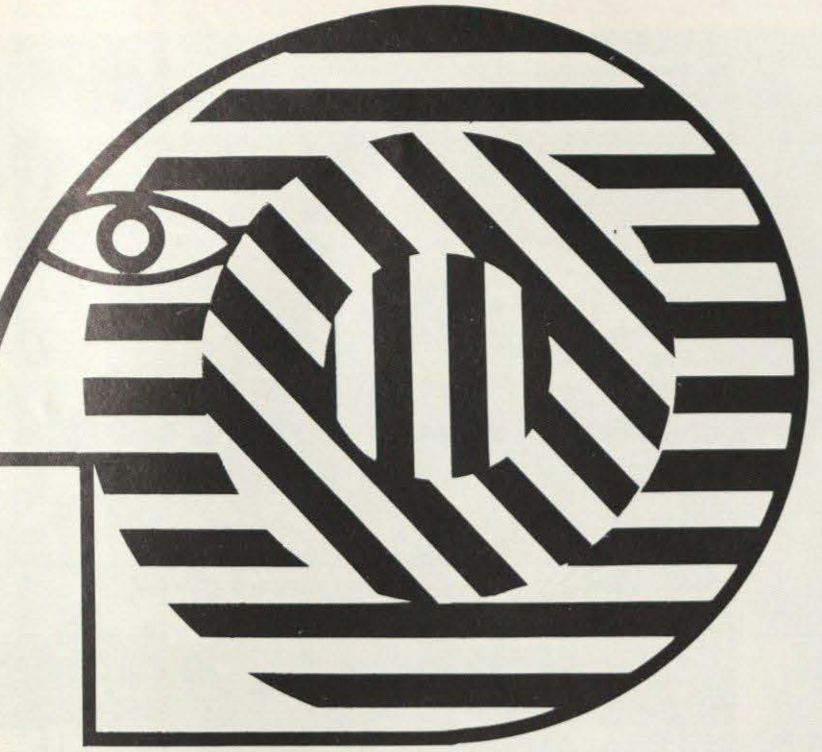


don't be UPSET

A world famous aerobatic pilot rolled his airplane dangerously close to the ground during an airshow in a Midwest city. The aircraft crashed.

A light aircraft zoomed low over a densely populated suburban area of a West Coast town and buzzed residences at tree top level.

A pilot took off in a light airplane after dark from a small airport surrounded by mountains in a far Western state. The pilot was found dead in the wreckage.

Any similarity between these incidents?

"Yes," say the FAA's Office of Aviation Medicine. "In each case the pilot was emotionally upset."

In the first incident, the aerobatic flyer, who escaped serious injury in the crash, told friends that he never should have attempted low level maneuvers that day. He had attended the funeral of a member of his family the day before and had an argument with another air show participant just before he went up.

"I was too upset to fly," he confided later.

In the buzzing incident, a woman whose excellent record as a pilot included service as a WASP during World War II, told FAA investigators the buzzing was the result of a disagreement with a boy friend shortly before she took off.

In the third incident, the pilot had a serious disagreement with his wife and then drove to the airport in a disturbed state.

"We are all human and subject to emotional upsets," explained an FAA flight surgeon. "We have enough evidence from investigations to conclude that acute emotional upset may lead to hazardous flight acts."

Another case supporting the theory involved four relatives; three were very prominent businessmen. They had just attended the funeral of a close relative in the Midwest and though the FAA flight service station reported storms, low ceilings and rain, and advised them not to fly, they decided to "push through." The aircraft encountered a squall line and struck a mountain; all were killed.

"The men were upset, having come from the funeral of a loved one; this is normal," said the flight surgeon. "We strongly recommend that a pilot who has just attended a funeral of a member of his family not fly until the acute emotional depression has passed."

The physician explained that a death in a family may cause a psychological phenomenon in which persons close to the deceased temporarily reject the thought or possibility of death for themselves.

"The funeral can cause pilots to lose temporarily the normal fear or phobia which is the protective mechanism that keeps us from foolhardy acts," the flight surgeon stated.

"Buzzing an area is often a hostile aggressive act which is the result of an emotional upset. We have in our files a great number of buzzing incidents involving a man who buzzes the home of a girl friend who has rejected him.

"We also have examples of pilots who buzz the home of a mother who had attempted to discourage her son from flying.

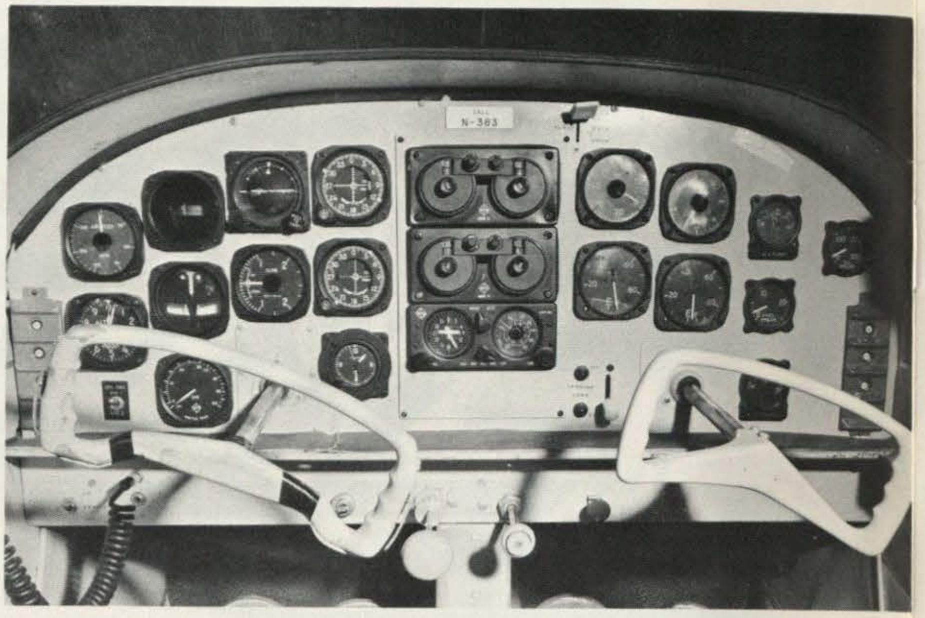
"He goes up and is determined to show her what he can do as a pilot."

It has long been recognized that many automobile drivers get involved in accidents just after an argument or some other form of upset. It is dangerous enough for the motorist to drive when upset, but more so for the pilot who is concerned with roll, yaw, pitch, wind drift correction, navigation, communication, power settings, stall and other routines of flying. A pilot should not be preoccupied by other matters.

One FAA aerospace physician said he thought that a high percentage of all general emotional upset, weather conditions or flying after the consumption of alcohol—or a combination of two or three of these factors.

The Air Force and Navy have recognized the emotional problem for many years and use psychiatrists to interview pilots whose flying has been below acceptable standards. The psychiatrists determine when the emotional factors have cleared up enough to let the pilot fly again. But civilian pilots themselves have the major responsibility to avoid piloting an aircraft during periods of emotional upset.
aviation fatal accidents can be attributed to

This is the second in a series of articles on research projects at the FAA's National Aviation Facilities Experimental Center (NAFEC) at Atlantic City, N. J.



This is how the simulator instrument panel looked before remodeling.

short cut to an **IFR ticket?**

Busy in the cockpit? Many IFR pilots are.

With more and more pilots now flying the gauges, many find the cockpit an exceedingly busy place at times. Not only does the pilot have to handle the controls and navigate, he also has to watch his instruments and communicate with air traffic control.

Can anything be done to ease the work load in the cockpit?

Ingenious NAFEC engineers pondered the problem and decided *to see what instruments were already available that would make IFR flying easier.* While not concerned with training as such, they felt that one effective research method would be to study two groups of students. One group would take IFR training using instruments generally found in today's general aviation aircraft. The second group would take IFR training using the most effective type of instrumentation available. Instrument cost was to be no object.

NAFEC engineers decided to test the effectiveness of the instrumentation in a simulator, as well as in an aircraft. But first they felt that they had to see if simulator training would be a valid "test bed" for the instrumentation. To do this they set up a typical IFR training program comparable to courses given anywhere in the country. They studied 32 instrument panels and installed in their Link trainer a panel similar to, but not necessarily the same as, existing displays.

The group of trainees was carefully selected to reflect a cross section of people who might take instrument flight training anywhere from Maine to Hawaii. They varied in age, educational background, aptitude test scores and flight experience—from no flight hours to more than 1,000. The eight out of 10 who completed the course and were checked out by an FAA examiner averaged 55.4 hours—49.3 in the simulator and 6.1 in a typical general aviation aircraft—a Cessna 210. The engineers compared this to statistics secured from the FAA record center in Oklahoma City. When they learned that the 457 persons who had received instrument ratings in a typical month last year averaged 54 hours of instrument instruction and practice, they concluded their method was valid. As a side benefit, they felt it was clear that the simulator was a perfectly acceptable training tool.

Then the engineers got to work on the job they started out to do—redesigning a general aviation instrument panel. Using instruments presently on the market, but not worrying about cost, they installed similar experimental panels in both the simulator and the Cessna. Not pushing any particular instruments, they wanted to show what could be done with what was available. The experimental panels included:

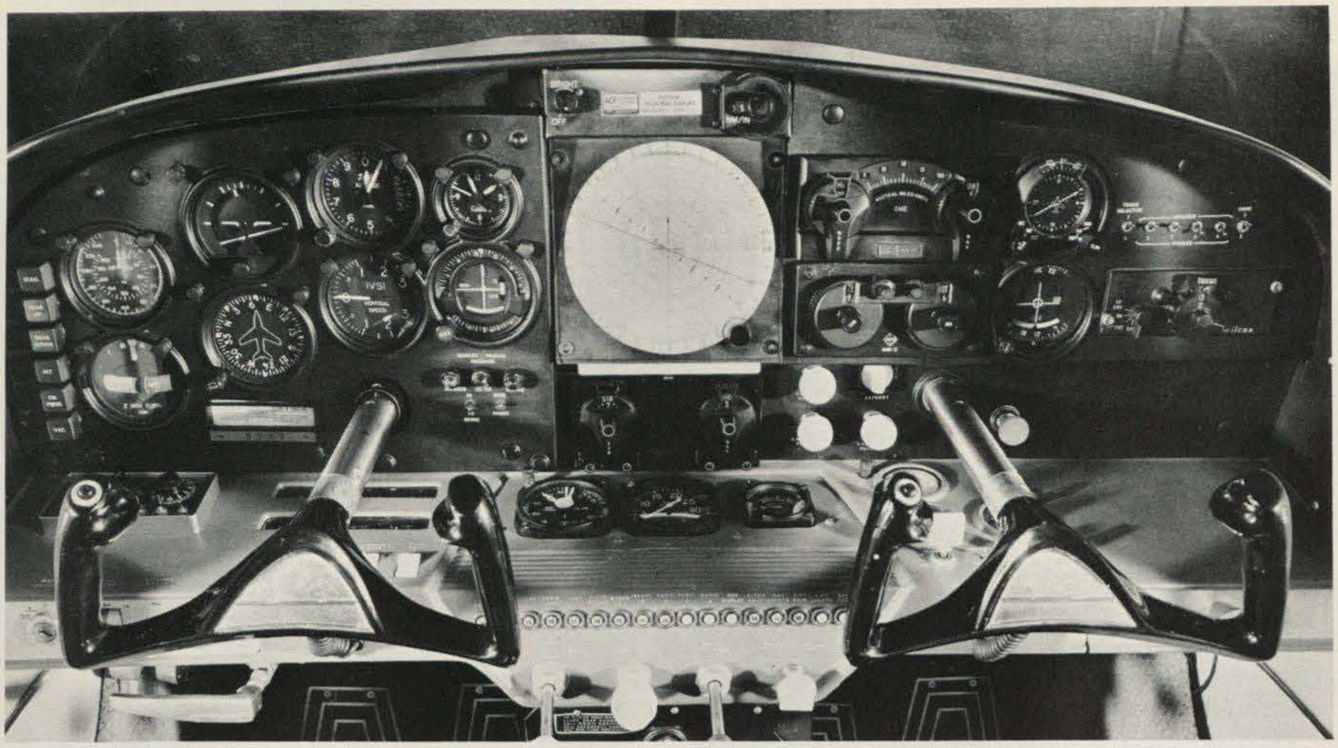
1—Automatic pilot/nav coupler
2—Pictorial display
3—Instantaneous vertical speed indicator
4—Directional gyroscope instead of a conventional gyro
5—A five-inch attitude gyro which works the same as a three-inch gyro, but the visual display represents the earth and sky
6—Digital readout OMNI
7—Cockpit voice recorder

The needle ball was removed. However, the engineers said that while generally pilots could theoretically fly without it, the needle ball—or something that does the same job—is necessary. They pointed out that some manufacturers today have taken out the needle ball and put in a turn coordinator.

The autopilot shoulders much of the work of the pilot. It keeps the wings level, maintains altitude and holds the heading. The equipment automatically captures and tracks the VOR radials and ILS localizer. The pilot does not have to work yoke or rudders manually except during take off and landing.

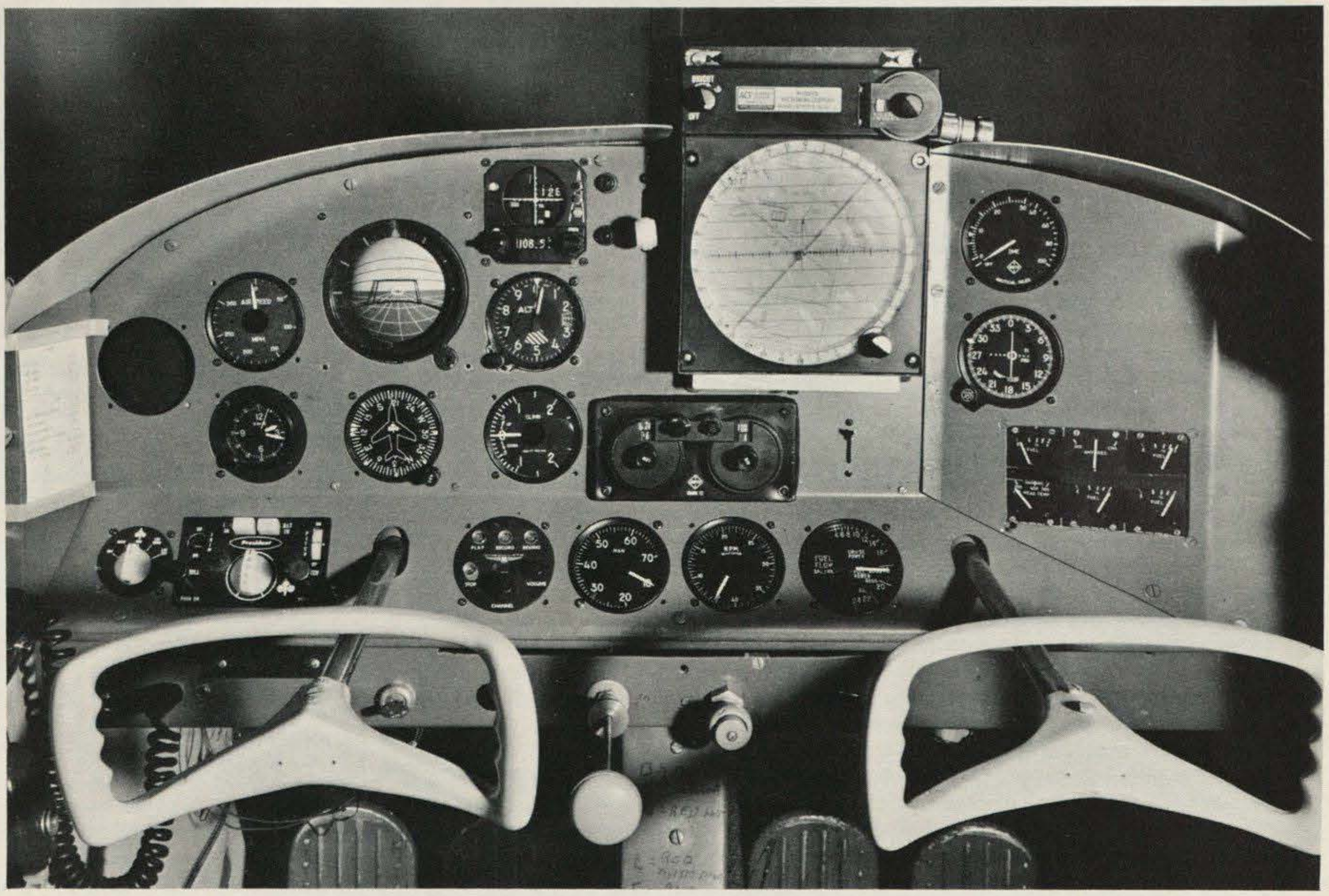
Navigation is made simple when VOR and DME information, taken automatically, drives a red "bug" across the pictorial display and locates the pilot geographically on a map of the areas he's flying over.

With the experimental panels installed



Instrument panel in aircraft as redone by NAFEC engineers to conform to program requirements.

Modified panel, here shown in simulator, is credited with halving IFR training time.



Robert J. Ontiverous, NAFEC engineer, explains the pictorial display.

This "geographic position recorder" helps simulate air traffic control. Arthur Madge, an FAA instrument ground instructor, takes the role of the controller in the tower cab, the departure controller, the approach controller or the controller in the center, as the situation demands. The pilot in a simulator, following a typical IFR flight plan, "flies" across the country talking to controllers as he goes into and out of various airports. Madge gives clearances and pumps in problems, including missed approaches, holding patterns, wind, radar vectors, radar approaches, etc., problems the pilot can expect to meet when he flies in the outside world. The position recorder traces the path of the aircraft on the map and shows whether or not the pilot is staying on course. Many pilots take their simulator flights so seriously they come out of the simulator sweating after handling the problems Madge has thrown at them.

in both the simulator and the aircraft, a second group of trainees was selected. Every effort was made to have the second group as much like the first group as possible. Not only were age, educational background, aptitude test scores and flight experience considered, but psychologists were called in to assist with the evaluation of the applicants. Finally a group of 10 was put together and judged to be comparable with the first group.

When the second group, which took the same course of IFR training, was checked out by FAA inspectors, NAFEC engineers felt their efforts had been worth while: *Improved cockpit displays and controls had cut learning time by more than half!* Students averaged 18.5 hours in the simulator and 6.5 hours in the airplane—25 hours compared with 55.4 hours. There were no instances of spatial disorientation.

The conclusion was clear: Instrumentation — available today — can cut down training time and reduce the IFR pilot's workload in the cockpit.

NAFEC engineers emphasized that the reduction in training hours was due solely to the instrumentation, not to training methods.

As to the high cost of some of the instruments like the expensive pictorial display, NAFEC engineers believe that if they come into general use their cost will drop accordingly.

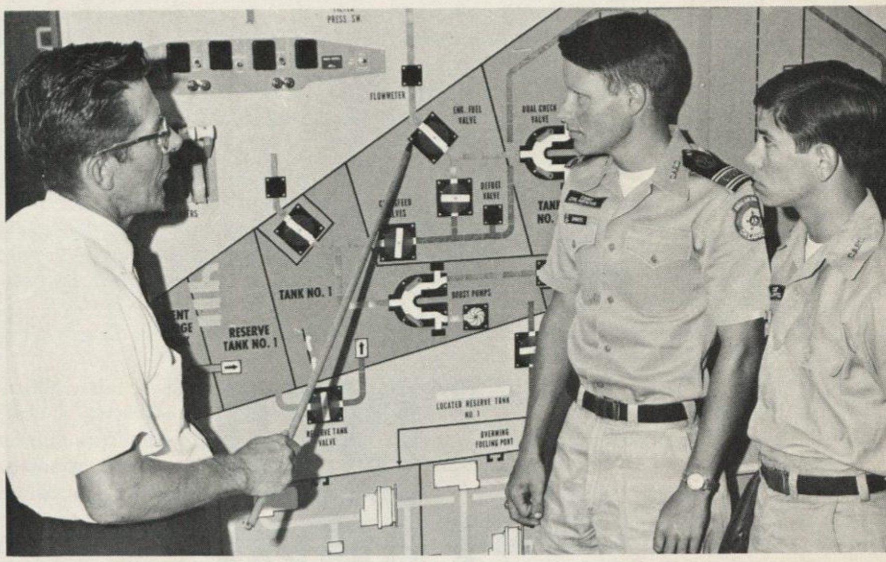
"The circuitry of the pictorial display is no more complicated than that of a TV set," one engineer said. "Today's high cost comes about because they are custom-made one by one. The tie-in equipment is also expensive, but some of today's aircraft are already equipped with that."

Reports are now being sent out to all manufacturers. NAFEC does not predict that any manufacturer will swallow their findings in one costly gulp, but does feel that slowly, over the years, these findings and others will be reflected on the instrument panels of general aviation aircraft.

The Agency encourages IFR flying and FAA specialists have seen enough pilots receive their IFR ratings to know that the average pilot can make the grade if he makes the effort. And when he does, he'll be a better, safer pilot.

Inquiries about this study should be addressed to FAA, DS-30, Washington, D. C. 20553.

Civil Air Patrol cadet, left, learns air traffic procedures by using remote controlled model air liner at the FAA Aeronautical Center, Oklahoma City. The intricacies of a fuel system, below, lose their mystery as an instructor traces fuel flow from tank to engine on a multi-color chart for two CAP cadets.



A Fledgling Grows Up

The Civil Air Patrol is 25 years old this December. In a quarter of a century it has done as much to foster the growth of general aviation in the United States as any single agency.

Air Force Col. Joe L. Mason, CAP national commander, declares: "We are dedicated to two overriding and basic interests—aviation and education. These interests are the foundation of our organization. The tasks associated with these aims are so broad in scope that we feel we have in our organization a place for everyone. We further believe that in a few years Civil Air Patrol may become the number one source of new pilots for airlines, military and general aviation fleets."

The organization first began offering flight training to cadets at Elmira, N. Y., during the summer of 1965 (*FAA Aviation News*, October 1965). The initial program provided flight instruction to 28 cadets. In one short year this has increased to five times that number at three sites across the nation. At the same time individual wings of the CAP have caught the "put 'em in the cockpit" spirit and started turning out pilots from their own resources within the wing. The goal of CAP is eventually to offer flight training in each of its 52 wings, thereby producing about 2,000 new pilots annually.

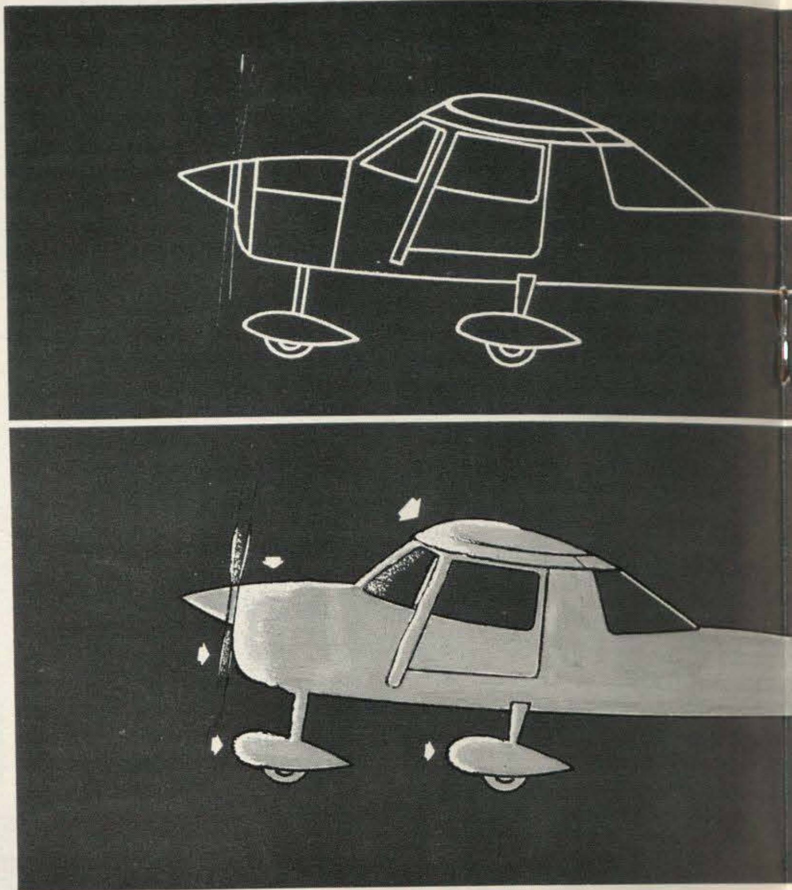
The Civil Air Patrol airfleet is made up of 823 corporate and more than 4,000 privately owned aircraft. During the coming year the organization will begin modernizing and enlarging the fleet with the planned acquisition of 100 new aircraft. Hardly a day goes by without this CAP fleet getting a call to help find a lost child or overdue aircraft. In the past five years CAP pilots have flown 2,006 search and rescue missions. In 1965 they flew 20,673 flying hours on these missions, accounting for more than 75 per cent of the total flying hours expended on search and rescue operations in the United States.

Members are professionals, business and civic leaders, housewives, laborers, technicians and students. In addition to its search and rescue operations, CAP has provided the incentive for thousands of American youth to seek aviation careers. From its ranks have come nearly 10 per cent of each graduating class of the Air Force Academy. CAP conducts aerospace education workshops for teachers to further their knowledge of the aerospace sciences.

In many communities across the nation FAA regional flight examiners have joined CAP units to share their aviation skills with young men and women of the CAP cadet program. As one examiner put it, "It's a truly great day when you can watch a youngster you worked with enter a lifetime career in the cockpit of an airliner."

To assist CAP to carry out its functions, the FAA has a member attending each of the national executive meetings to assist with questions concerning general aviation. In addition to the joint CAP-FAA coordinating committee, the FAA provides upgrading training for 20 of the organization's mission-rated pilots possessing current FAA flight instructor ratings. FAA also upgrades another group of 30 CAP pilots in a T-34 orientation program.

"In 1963 we had 52 aircraft accidents," Colonel Mason said. "Since the introduction of the FAA program conducted at the FAA Academy in Oklahoma City we have witnessed better than a 60 per cent reduction in aircraft accidents in two years."



ICING: The COLD FACTS

Ice is nice for hockey players, bartenders and polar bears—but definitely injurious to the health and welfare of aircraft. But because aircraft icing is a fact of life, it is useful to know something about the phenomenon even though nothing can now be done about the natural forces that create it.

Airframe icing occurs when the surface of the plane is colder than 0 degrees Centigrade and subfreezing liquid droplets are present in the atmosphere. When the two are combined, the aircraft begins picking up ice. Airframe icing can occur anytime visible moisture is present and the free air temperature is 0 degrees Centigrade.

The formation of ice or frost on an airplane always creates a detrimental effect on performance. CAB accident reports indicate that experienced and inexperienced pilots all over the country get caught. The same winter day that a private pilot in upper New York (85 hours) stalled in his initial climb with a quarter inch of ice on half his wing surface, a commercial pilot (5,000 hours) with an instructor rating undershot and stalled on his landing approach in Idaho. He had an inch of rime ice on his wings. The next day a student pilot in Louisiana stalled on takeoff—again, ice on the wing.

Ice and frost on aircraft surfaces alter the aerodynamic contours and adversely affect the flow of air over the air foil. With the most important surface of the airplane being the wing, accumulation of ice or frost here can create significant changes in its aerodynamic characteristics. Ice piling up on the leading edge of the wing can produce a considerable increase in drag and a large reduction in maximum lift coefficient. Thus, the ice formation demands an increase in power and raises stall speed. The added weight of the ice must also be considered.

Frost, which accumulates on the ground, has a more subtle effect than ice on the wing's aerodynamic characteristics. The accumulation of a hard frost coat on the wing upper surface produces a rough texture. While the wing's basic shape and contour is unchanged, the roughness increases skin friction and reduces the kinetic energy of the boundary layer. The increase in drag, though not

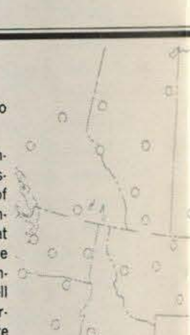
SEVERE ICE STORM

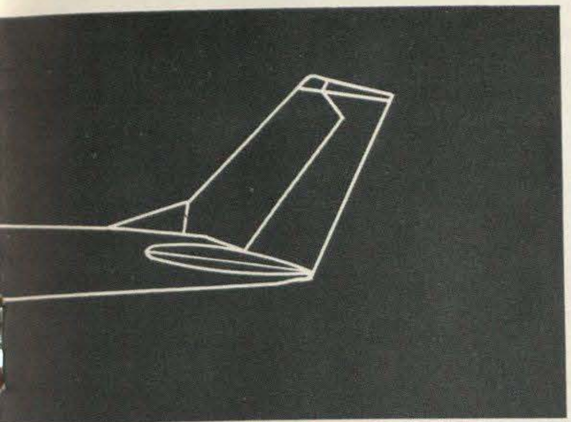
Bad Weather Area: From Iowa eastward to Lake Erie.

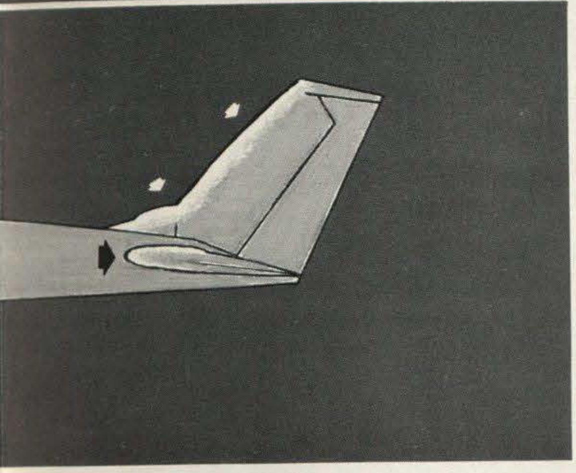
Features: A well-defined and extensive warm-front with an approaching intense low-pressure center moving east-northeastward out of Colorado. Note the 42-degree Fahrenheit temperature difference across the warm front at the Mississippi River. Equally significant is the northward penetration of high dewpoint-temperatures in the warm air. Freezing rain fell for hours in a narrow band north of, and parallel to, the warm front. A strong temperature inversion (warming with height) would have been found immediately above the warm frontal surface at about 3,000 to 5,000 feet in this case. At 10,000 feet in this zone, winds were reported from 250 degrees at 70 knots. No icing would be encountered in the inversion, but formation would be **heavy** and **rapid** when flying through the lowest layers near the ground. Good advice to VFR pilots—when freezing rain is observed or imminent, don't fly!

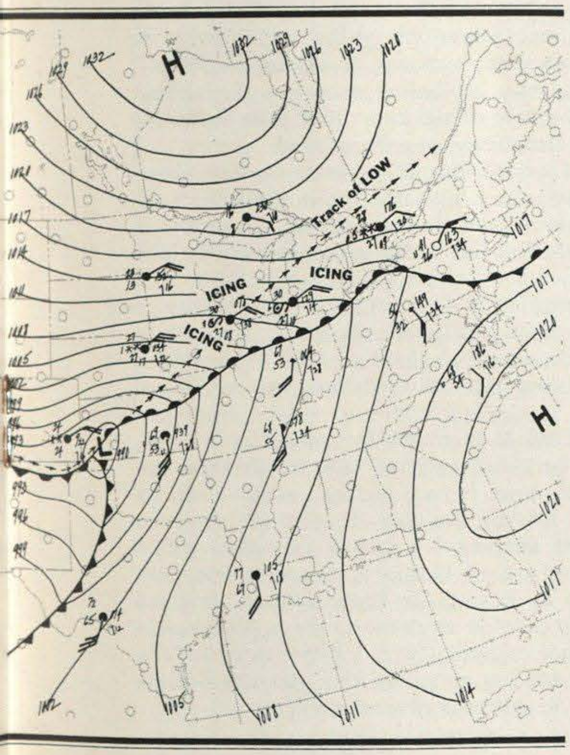
Early Signs:

1. A shallow slope of the warm-frontal surface—as might be revealed by radiosonde observations or aircraft observations of a sharp temperature inversion at low levels;
2. A good supply of subfreezing air upwind at low levels to keep the air below the inversion below freezing;
3. A sky that looks "rainy," rather than "snowy," to the practiced eye.









as great as the increase caused by the severe icing, invites incipient wing stalling. The most elementary safety precaution is to avoid areas where icing conditions are forecast unless your plane is equipped with suitable deicing equipment. Then follow the recommended anti-icing procedures specified in the aircraft owner's handbook.

Latest developments along this line include electrical current or hot air to prevent accumulation of ice, but this equipment is found only on the newest and most expensive planes. Hot air deicing systems are normally found on turbine aircraft. The electrical current system, which consists of fine wires encased in rubber boots on leading edges, is commonly found on the bigger reciprocating aircraft. Also of interest is the alcohol deicing system of the deHavilland Dove.

The old standbys, the pulsating pneumatic boot which is activated by engine-driven pumps, and anti-icing fluids used on rotating surfaces such as propellers and helicopter rotor blades, remain the most widespread ice control devices in general aviation. While the engineers can't do anything about weather conditions that create icing, they have done something about controlling its effect on aircraft. The meteorologists are doing their part in refining their forecasting techniques.

Aircraft ice comes in three clearly identifiable types—rime, clear or a combination of the two. Rime ice, rough, milky and opaque, is formed by the instantaneous freezing of small supercooled droplets as they strike the aircraft. Rime occurs predominantly in stratus-type clouds. Clear ice, glossy, clear or translucent, is formed by the relatively slow freezing of large supercooled droplets. Clear ice is more predominant in cumulus-type clouds.

Modern terminology classifies icing as *trace, light, moderate* and *heavy*, replacing the old standard terms of *light, moderate, severe* and *extreme* which had been used by the Air Force. The new terms have been adopted by the FAA, NASA, Air Force, Navy, Army, Coast Guard and Weather Bureau.

The mechanics of aircraft icing are well known. Clouds, the place to begin tracing what happens, consist of droplets of water, usually supercooled. Vertical movement of moist air causes clouds to form. As the air rises, it expands and the temperature drops. When the temperature falls below the dewpoint of water, it condenses and forms clouds.

The supercooling effect, the phenomenon whereby the water remains in a liquid state even though the temperature is below the normal freezing of 0 degrees C, is quite extensive. But, if an aircraft disturbs the supercooled water by flying through it, spontaneous freezing occurs.

A variety of meteorological and aerodynamic factors determine the occurrence and intensity of airframe icing. Temperature has a direct effect on the portion of water which freezes. The liquid water content in the cloud is probably the most important in determining the ice accumulation rate. The higher the liquid-water content, the greater the ice accumulation. Maximum liquid-water concentration usually occurs at a lower level in stratiform clouds than in cumuliform clouds. Within the cloud, the liquid-water content increases with altitude to a maximum value and then decreases. Droplet size also affects the icing rate. The larger the droplets, the faster ice will accumulate. The droplet size is larger in cumuliform clouds than in stratiform clouds.

Icing in general aviation aircraft is generally thought of as only involving the leading edges of wings and tail surfaces. Ice also accumulates on windshields, antennas, air scoops, fixed landing gears, propellers and other surfaces. Vulnerable are static ports. Icing of these will adversely affect altimeter, air speed and rate of climb instruments. Also, carburetor icing may occur with free-air temperatures well above freezing when fuel is mixed with air having the proper temperature-moisture conditions.

Not exempt from icing are helicopters. Canadian National Aeronautical Establishment experiments demonstrated that a 3/16 inch layer of ice on the main rotor blades of a helicopter is more than sufficient to prevent a helicopter from maintaining altitude during hovering flight. Tail stabilizing rotor blades, control rods and air intakes are also vulnerable to icing.

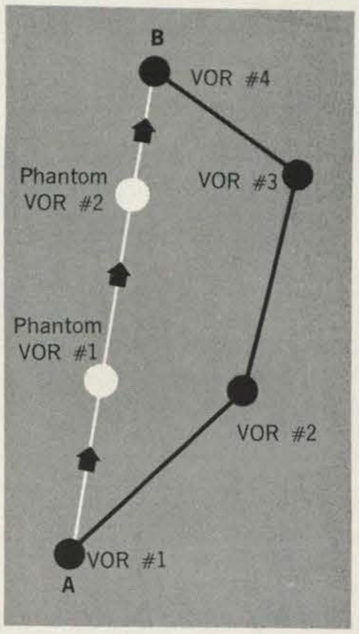
With more and more jets entering business aviation, the problem of icing merely takes on another dimension. While these craft fly at altitudes where icing is not generally found, they sometimes encounter airframe icing during climb, let-down, approach, go-around and low-level operation in icing conditions.

To fly safe in winter is a cooperative effort on the part of the weather forecaster, the weather briefer and the pilot. Get acquainted with the weather—and the weatherman. (See "You've Got It Coming," *FAA Aviation News*, October 1966.)

CASPER'S COMPETITION

a new friendly phantom

When flying from A to B by VOR radials the pilot must fly from VOR #1 to VOR #2, to VOR #3 and VOR #4. Using PD/CLC, the pilot can establish an intermediate destination (phantom VOR #1) on the direct track between A and B and fly to that point. After passing phantom VOR #1 he can set up phantom VOR #2 and fly to that destination and then to point B.



At a meeting in Frankfurt, Germany, Raymond B. Maloy (right), assistant administrator for the Europe, Africa, Middle East region, explains PD/CLC to 29 high-ranking aviation officials from 14 European countries.

It was a ghost story, all right, but it wasn't spooky. In fact, the high-level aviation officials representing 14 European countries and the United States were cheered by the tale of the friendly phantom with the unlikely name of pictorial display/course line computer—PD/CLC for short.

The distinguished civilian and military group had been invited to watch PD/CLC in action by the Federal Aviation Agency's assistant administrator for the Europe, Africa, and Middle East Region, Raymond B. Maloy. Co-host was *Bundesanstalt fuer Flugsicherung*, the West German air traffic control authority. The demonstration, held in Frankfurt, Germany, enabled them to "see" phantom VORs generated by a special computer installed in the cockpit. The PD/CLC system lets the pilot know where he is, exactly and at all times, while flying by VOR/DME or VORTAC navigation.

The electronic sleight of hand that makes the navigation equipment in the plane believe in the existence of nonexistent VORTACs was the result of FAA brainstorming several years ago. The air traffic congestion created by the increased number and speed of aircraft competing for limited air space was costing hundreds of thousands of dollars a year. Installing additional VORTAC facilities in large numbers might solve one problem, but would create equally formidable technical and financial ones.

The essence of PD/CLC is that pilots can navigate to a given destination without flying actual VOR radials. The theory was that if the pilot could see his actual position and actual track over the ground by means of an aircraft symbol moving across an aeronautical chart, he could navigate along any desired track without depending on point-to-point navigation.

Here are the A-B-C's on how the system works:

The pilot inserts an appropriate chart covering the area of the route to be flown in the display frame and manually sets up an arbitrary destination (phantom VOR) by adjusting coordinate knobs. These knobs represent distance in nautical miles and bearing to the spectral VOR. Once airborne, a reference VORTAC is tuned in and the symbol representing the aircraft moves across the face of the chart to a point indicating the position of the plane over the ground.

At the same time, information from the omni-bearing selector, deviation indicator, radio magnetic indicator, and distance measuring equipment is combined in the computer so that the readings on the various indicators are related to the selected phantom VOR as if it were an actual VORTAC. The pilot then flies to the destination he has selected. In short, the result is that an infinite number of phantom VORTAC stations can be established without installing any additional facilities.

While PD/CLC is intended for eventual civil use, the U.S. Air Force is impressed with its phantom station capabilities and is considering using it in jet training. The USAF Training Command has been having difficulty keeping its student jet pilots within assigned practice areas. During a demonstration near Randolph AFB in Texas, Air Force officials observed that the system enabled students to fly approaches to training fields not equipped with navigation aids. The Training Command has borrowed four pictorial displays from FAA for the purpose of evaluation.

Status Report:

Category II Landings

The FAA is moving ahead with plans to reduce weather minimums for small aircraft under certain conditions.

A year ago the FAA issued proposed rule-making on Category II weather minimums for general aviation. The response indicated that the program was of interest not only to operators of small turbojets and airplanes weighing more than 12,500 pounds, but also to many small plane operators, including air taxis. The final rule, still under preparation, will be applicable to any interested and qualified general aviation airplane owner.

Category II operations are defined in Advisory Circular 120-20 as operations below the minimum ceiling of 200 feet and 2,600 feet runway visual range (RVR) and to as low as 1,200 RVR and 100 feet decision height (DH). In addition to pilot qualifications, the airplane must be properly equipped to operate under these lower minimums. Moreover, the airport at which Category II operation will be conducted must have ILS equipment with better signal integrity and beam quality, approved lights with sequenced flashers, 3,000 feet of touchdown zone lighting, threshold-to-threshold center line lights and high intensity edge lights.

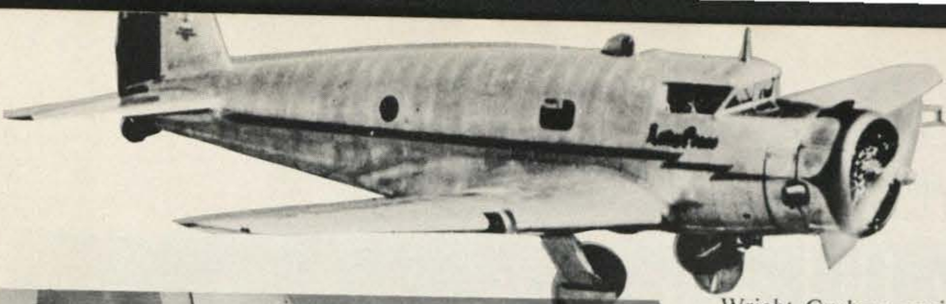
FAA expects some 25 airports will be equipped for Category II operations by 1968; FAR Part 97 will list these airports. Category II minimums, as in the case of other IFR minimums, will also be shown on appropriate approach charts.

For the first six months, FAA authorization to qualified Category II pilots will be limited to operational minimums of 1,600 RVR and 150 DH. The same policy prevails in the case of air carrier authorization. With the first six-month renewal of pilot qualifications, FAA may authorize minimums of 1,200 RVR and 100 DH.

Category II will still require the pilot to have visual contact with the runway in use before attempting a landing. However, the operational concept of "decision height" differs from the traditional meteorological ceiling. The DH is defined as the height above the elevation of the touchdown area at which the pilot initiates a missed approach if he has not established adequate visual reference. The pilot's decision-making will begin as he starts his ILS approach. It continues during descent on the glide slope as he evaluates all available visual indications and other landing factors. Consequently, by the time he reaches the DH he will have made up his mind whether or not to continue the approach.

Two qualified pilots will be required for Category II operation. Basic pilot requirements for Category II eligibility will include an instrument rating (with ATR, commercial or private certificate), at least 250 hours of cross-country experience, 75 hours of instrument flight (of which not more than 25 may be simulated) and 50 hours of night flight experience. Pilots will have to undergo a proficiency flight check every six months, have at least six hours of actual or simulated IFR flight time in the six months preceding the flight check and, in the same six-month period, have at least six actual or simulated ILS approaches to the lowest published minimums.

Copies of FAA Advisory Circular 120-20, "Criteria for Approval of Category II Landing Weather Minima," June 6, 1966, may be ordered without charge from FAA, HQ-438, Washington, D. C. 20553, with a self-addressed mailing label.



Harry Richman (left) and Dick Merrill filled wing and tail spaces with ping pong balls to give their plane buoyancy.

SAGA of the Ping Pong Flight

For years, the American people had been spiritually starved. . . . Something that people needed if they were to live at peace with themselves and the world was missing from their lives. All at once, Lindbergh provided it. Romance, chivalry and self-determination—here they were embodied in a modern Galahad for a generation which had foresworn Galahads.

—Frederick Lewis Allen in *Only Yesterday*

Secretly yearning to be a Galahad himself, Lindbergh-style, was an American almost as famous as Lindy—the colorful song and dance man of the '20s and '30s, Harry Richman.

But his trademarks, a straw boater and a twirling walking stick, were not the stuff of which Galahads were made. Richman sought the ingredients instead in a wild dream—and 50,000 ping pong balls.

A pilot, Richman longed to surpass the feats of Lindbergh, Earhart, Rickenbacker and the other famous fliers of the day. He was inflexibly determined to do what none of them had accomplished—take off from New York, fly nonstop across the Atlantic to London, refuel, turn around and fly nonstop back to New York. No one had ever flown the Atlantic both ways.

Richman hired Dick Merrill, a senior pilot for Eastern Air Lines, to make the trip with him. Their preparations in the late summer months of 1936 were as fascinating as the eventual flight itself.

Richman purchased a second-hand Vultee, named it *Lady Peace,* and had it specially equipped with a 1,000 h.p. Wright Cyclone engine which had been produced under the test supervision of the U.S. Army.

Adjustments were also made in the plane so that it could carry 1,000 gallons of fuel—"a flying gas tank," as Richman called it.

But the one device that set the plane apart from all others was one that cast public doubt on the seriousness of the entire flight. Richman and Merrill loaded 50,000 ping pong balls into the fuselage to give the huge craft buoyancy if it was forced down at sea.

On a foggy Sept. 2 in 1936, thousands of people—among them Amelia Earhart—assembled at Floyd Bennett Field. The press had given the preparations a great deal of coverage and Richman was accused of having no other motive for the flight than pure publicity. Late in the afternoon, through the heavy overcast, the spectators held their breaths as the aluminum ship made a precarious take-off, clearing Flatbush Avenue by inches. After 40 seconds it was airborne. Close behind was Eastern's general manager, Capt. Eddie Rickenbacker, who escorted them up the New England coast toward Newfoundland in a DC-3. At 3,000 feet Richman and Merrill broke out of the clouds into bright sunlight.

"I began to think that sometime in the not-too-distant future, people would do this as a matter of course, never giving the ocean crossing a second thought," Richman said.

But 600 miles from Ireland, the two pilots hit a thunder storm and the electrical system was knocked out. Despite the public ridicule he had suffered, Richman became grateful for his 50,000 ping pong balls. But the weather finally cleared and they landed undamaged in a Welsh cow pasture, 175 miles short of their Croydon Airport goal in London, after a flight of 18 hours and eight minutes. The next day they completed their journey.

On Sept. 13 they left Southport, England, for the return flight to New York. But 1,200 miles from Floyd Bennett Field, about an hour and a half from Newfoundland, ice started to form on the wings. *Lady Peace* started to drop faster and faster. Having dropped to 50 feet above the water, Richman again thought of the ping pong balls that would save his life. He and Merrill dumped nearly 700 gallons of gas into the ocean before reaching what they thought was a level field on an island near Newfoundland. Merrill brought the craft in for a landing, but it wasn't level. It was a muddy bog from which it took them three days to get the plane unmired. Rickenbacker flew to the island to take them enough gasoline to get home, but the trip to New York, the last leg of the trip, was anti-climactic. Their record had been set; their goal realized. In 17 hours and 24 minutes flying time, Richman had accomplished what no one before had ever done. He and Merrill were the first to cross the Atlantic both ways.

Today, Harry Richman leads a quiet life in North Hollywood. Gone are the days when he courted glamorous stars such as Clara Bow and Jean Harlow; was the intimate of men ranging from Al Capone and Eddie Cantor to Joseph P. Kennedy and the Prince of Wales; was the first American to give a private command performance for the King and Queen of England and was this country's most popular entertainer. Though he earned $13 million in his heyday, he has spent it all.

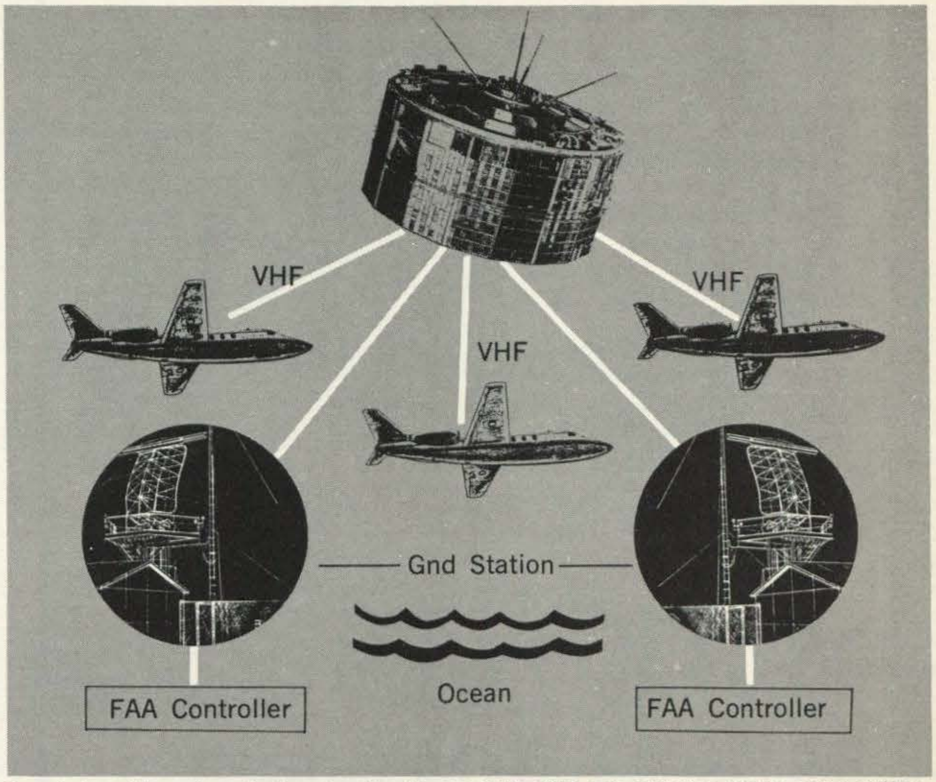
He had invested some $340,000 in the flight which he regards as the high point of his life—a life that had the bounce of 50,000 ping pong balls. *By Sue F. Silverman*

MOONLET, 22,300 MILES OUT, TO ASSIST AGENCY IN COMMUNICATION STUDY

The Federal Aviation Agency will evaluate an applications technology satellite (ATS-B) for relaying over-ocean very high frequency (VHF) communications between aircraft and land stations.

The ATS-B satellite, due to be thrust into outer space by NASA from Cape Kennedy on or about Dec. 6, will be permitted to drift to 151 degrees west longitude on the equator south of the Hawaiian Islands and remain in stationary orbit 22,300 miles above the earth.

ATS-B will be the first of several experimental satellites to be launched to test new methods of weather observation, and navigation and communication systems. ATS-A, ATS-C and others are to be launched later.



Up and down links and coordination channels will connect the ATS-B with controllers through ground stations.

Air-Ground Voice Control

FAA's principal interest in the ATS-B is in testing VHF satellite communications equipment designed to improve air-ground voice control in transocean flights.

Agency air traffic control experts and engineers look to satellites as a possible means of replacing or supplementing point-to-point communications between widely separated air traffic control centers as well as between traffic control facilities and aircraft engaged in over-ocean flights.

Need for better communication will become more pressing as air traffic volume continues to increase. The increase in North Atlantic flights by International Air Transport Association airline members from 32,337 in 1960 to 55,025 in 1965 reflects the growth of transoceanic air traffic. General aviation and military oceanic flights add to this total. There were 67,306 flights controlled under instrument flight rules by the New York oceanic air route traffic control center during 1965 compared to 59,924 controlled by the same center in 1960.

Flights Will Double

The FAA estimates the number of trans-Atlantic flights will be handled through the New York ARTCC in 1975 will almost double those in 1965. It is anticipated that about 400 aircraft will cross the Atlantic Ocean on an average day during the summer months—June through September—of 1975.

Air traffic controllers see communication via satellites as a possible way to overcome present limitations of high frequency (HF) communications. Satellites may provide static- and fade-free pilot-to-controller channels and lessen the chance of losing communication with an aircraft in mid-ocean. Under the present system it is not uncommon to lose communication for periods of up to an hour.

For ATS-B tests, an FAA C-135 flight inspection aircraft will be equipped for satellite communication studies at the Agency's Aeronautical Center at Oklahoma City and the National Aviation Facilities Experimental Center, Atlantic City.

The ATS-B will hang in the sky in a stationary 22,300-mile orbit and rotate with the Earth south of Hawaii.

Under the present plans, a special upward-looking antenna will be placed on the C-135 at Oklahoma City. The electronic devices—a receiver and transmitter and other equipment—will be installed at NAFEC by April 1967.

Starting in May, an FAA crew will fly the C-135 from NAFEC to San Francisco and then to Alaska, the Hawaiian Islands and a point just under the satellite in the Pacific Ocean. This air route was designed to test limitations of the satellite communication system as well as the equipment in the Federal Aviation Agency aircraft.

Messages from an FAA air traffic controller in Alaska will be sent via ground lines to the NASA terminal at Mojave, Calif., where special facilities are available to relay the message to the aircraft via the satellite.

FAA personnel will collect data to evaluate use of experimental satellites in contacting aircraft. Engineers agree that VHF communication is an excellent way to maintain contact between air traffic control centers and aircraft. Now they hope satellites will be the means of putting it to use for commercial aviation.

news

BRIEFS

• THE FAA DISTINGUISHED SERVICE AWARD was presented to Jack B. Tarver (left) and J. R. Baker (right), executive pilots for the Olin Mathieson Corp., who successfully landed a twin-engine company plane after one of the engines tore loose in flight. Edward C. Marsh, FAA Central Region Director, made the presentation on behalf of the FAA Administrator William F. McKee at the annual meeting of the National Business Aircraft Association at St. Louis. The incident, which led to the award, took place last April when Tarver and Baker had six passengers aboard in a flight from Beaumont, Texas, to Monroe, La. At center, congratulating the men, is Cornelius N. Fulton, Jr., manager of Olin Mathieson's aviation department.

• "IT'S TIME we quit asking new pilots to struggle with basic flight instruments that have gone unchanged since the founding days of aviation." This is what Dr. Karl Frudenfeld, a pilot-physician, told his Flying Physicians Association colleagues at a recent national meeting. He urged them to join a professional crusade to improve "the cockpit environment" for the one million general aviation pilots he foresees by early 1970. For what the FAA is doing about the problem, read "Short Cut to an IFR Ticket?" (page 4).

• SON OF NAVION. The newly certified Navion H is coming off the production line at Sequin, Texas, at the rate of one plane every 1½ months. Company expects to turn up production to 20 per month by the end of 1967. The $29,500 standard price includes Brittain autopilot, King KX 160, 360 channel communication, 100 channel navigation receiver, King VOR/LOC indicator and vernier controls. Spec: 5-place; 200 m.p.h.; 285 h.p. Continental; plus 1,200-mile range with 108 gallon fuel capacity.

• ALL 'COPTER PILOTS now need helicopter instrument ratings to fly legally in IFR weather under a new amendment of Part 61 of the FARs. Before acting as pilot-in-command of an IFR helicopter flight, the new rule also requires pilots to have at least six hours of actual or simulated IFR time in the past six months. Three of the six hours must have been in a 'copter.

Continental Is 25th Air Carrier To Get SST Delivery Positions

FAA has received deposits from Continental Airlines to reserve delivery of three supersonic transports. The transaction raises the total number of SST reserved delivery positions to 108 and the total number of carriers holding reservations to 25. Each reservation is backed by an "advance royalty" payment of $100,000 on deposit with the U.S. Treasury.

Meanwhile, Government and airline aeronautical experts completed their evaluations of the final design proposals submitted by the two airframe and two engine manufacturers competing to build America's SST. The Boeing Co. and the Lockheed Aircraft Corp. are the airframe companies. The General Electric Company and the Pratt & Whitney Div. of the United Aircraft Corp. are the engine concerns. A decision is expected by the end of the year.

Opa Locka Claims Busiest Title; Chicago O'Hare in Second Place

If you suspected that 1966 might be the "flyingest" year yet, you're right.

FAA statisticians expect the total number of takeoffs and landings controlled by the Agency's 302 airport traffic control towers to top all previous years with an estimated 45.1 million.

This 19 per cent increase above last year's activity is the largest proportionate growth on record for this type of air traffic activity. Of the three categories of users, general aviation accounted for the highest number of takeoffs and landings, 33.8 million, and again registered the most significant 12 month growth—27 per cent.

Landings and takeoffs recorded for the air carrier fleet and for the military totaled 8 million and 3.2 million respectively.

Opa Locka, Fla., with an estimated 613,000 takeoffs and landings has replaced Chicago O'Hare (567,000 takeoffs and landings) as the busiest FAA-operated tower.

Van Nuys, Calif., was third with 541,000 takeoffs and landings. Itinerant operations at Opa Locka are estimated to account for 66 per cent (404,000) of total takeoffs and landings and local operations account for 34 per cent (209,000).

Opa Locka is a VFR tower operated only 16 hours a day.

FORUM

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Once Again, Please

Will you please furnish me the following information: (1) Private License—how many hours of training are required to obtain a private license? (2) Commercial license—how many hours above the private license is now required? Also, are there any changes now pending to increase this time? If so, when and to how many hours? (3) Instructors license—approximately how many hours of training above the commercial license is now required? Also, are there now any pending changes to increase this time? When and how much?

Arlington, Va.

Part 61 of the Federal Aviation Regulations contain the full requirements for the certificates you are interested in. Briefly, here is what is required:

(1) Private pilot—40 hours of flight instruction and solo practice including at least 10 hours of solo cross country flight time.

(2) An applicant for a commercial pilot certificate is required to have a total of 200 flight hours, including specified flight instruction, instrument, flight cross-country time and flight test preparation. Recommendations have been made which would increase total flight time for a commercial certificate to 250 hours, but this has not been officially proposed by the Federal Aviation Agency.

(3) An applicant for a flight instructor certificate is required to hold a commercial pilot certificate, or a private pilot certificate and meet the aeronautical knowledge, experience and skill requirements for issuance of a commercial pilot certificate. No flight time is specified beyond that required for the commercial certificate.

A certificated flight instructor's recommendation is required for the flight or practical test for each certificate.

• Wants Ground School Info

What information do I need to start and conduct a ground school? What materials will I need? What qualifications are required for teaching? I would also appreciate a list of publications that are available for advanced course.

Richfield, Idaho

Since a complete answer to your questions would be very lengthy, we have sent you Parts 141 and 143 of the Federal Aviation Regulations. Part 141 contains the requirements for issuing pilot school certificates and ratings, including basic and advanced ground school ratings. The minimum standards for classroom facilities, equipment, curriculum and instructors for approved ground schools are in subpart b of Part 141, which also outlines the required instructional materials and publications.

Part 143 contains the requirements for issuing ground instructor certificates and ratings to qualified applicants.

Some of the pertinent publications are available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, and some from private sources. Audio-visual film slide kits for classroom are available from your local FAA general aviation district office.

• Prop Tips

I would like to know why some aircraft in airline use do not have warning stripes painted on the propeller tips. It was my understanding that FAA required a four-inch-wide warning stripe, painted on the tip of each prop blade.

Chicago

The FAA does not require that warning stripes be painted on propeller tips. Present airline aircraft generally do not carry such propeller tip markings except in the case of aircraft using surplus military propellers whose tips would have been previously painted in accordance with military practice.

Even in the latter case, airlines may not maintain these markings because of wear from gravel, sand, dust and other conditions. From a safety standpoint, the airlines allow only authorized persons on the ramp and they are thoroughly trained in safe procedures.

• Morse Code for Pilots

Part 63 of the Federal Aviation Regulations requires an applicant to be able to "Identify at least three radio stations using International Morse Code. . ." and "to receive code groups of letters and numerals at a speed of eight words per minute." Although we have not succeeded in our efforts to locate any similar requirements in Part 61, we are nevertheless interested in ascertaining whether such provisions are applicable to pilots and flight instructors in accordance with any special regulation which might be in effect.

Mexico City

Part 63 of the FARs pertains to flight navigators. Provisions requiring the use of International Morse Code do not appear in the regulations of Part 61 for pilots and flight instructors. While the knowledge of International Morse Code may be helpful, it is not a prerequisite for a pilot or flight instructor certificate. The International Morse Code symbols and the station frequency are on every aeronautical chart.

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• Runway Markings

How are runways marked to indicate direction?

Upstate New York

As described in Advisory Circular 150/5340-1A, paragraph 6d, "Marking of Serviceable Runways and Taxiways," runways are now marked and numbered according to the magnetic heading of the runway as determined from the approach direction. For those runways that are not marked or where the marking has been obliterated, refer to the instrument approach procedure chart for the magnetic heading of the runways for that airport.

• Very Popular Item

The March 1966 *FAA Aviation News* had a brief article on density altitude which mentioned the FAA film on this subject and density altitude computers. We've seen the film on two occasions and are delighted with it, but we haven't seen the computers. How do we get enough to supply our flying club membership?

Name withheld

Free Denalt computers are available only upon receipt of FAA Form 8000-1, "Request for Denalt Performance Computer." These are distributed only to those viewing "Density Altitude" when shown by an FAA inspector. We regret you did not get the request form when you saw the film. However, Denalt computers are now sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for 50 cents each. Orders should specify whether computers are for aircraft with fixed-pitch or variable-pitch propellers.

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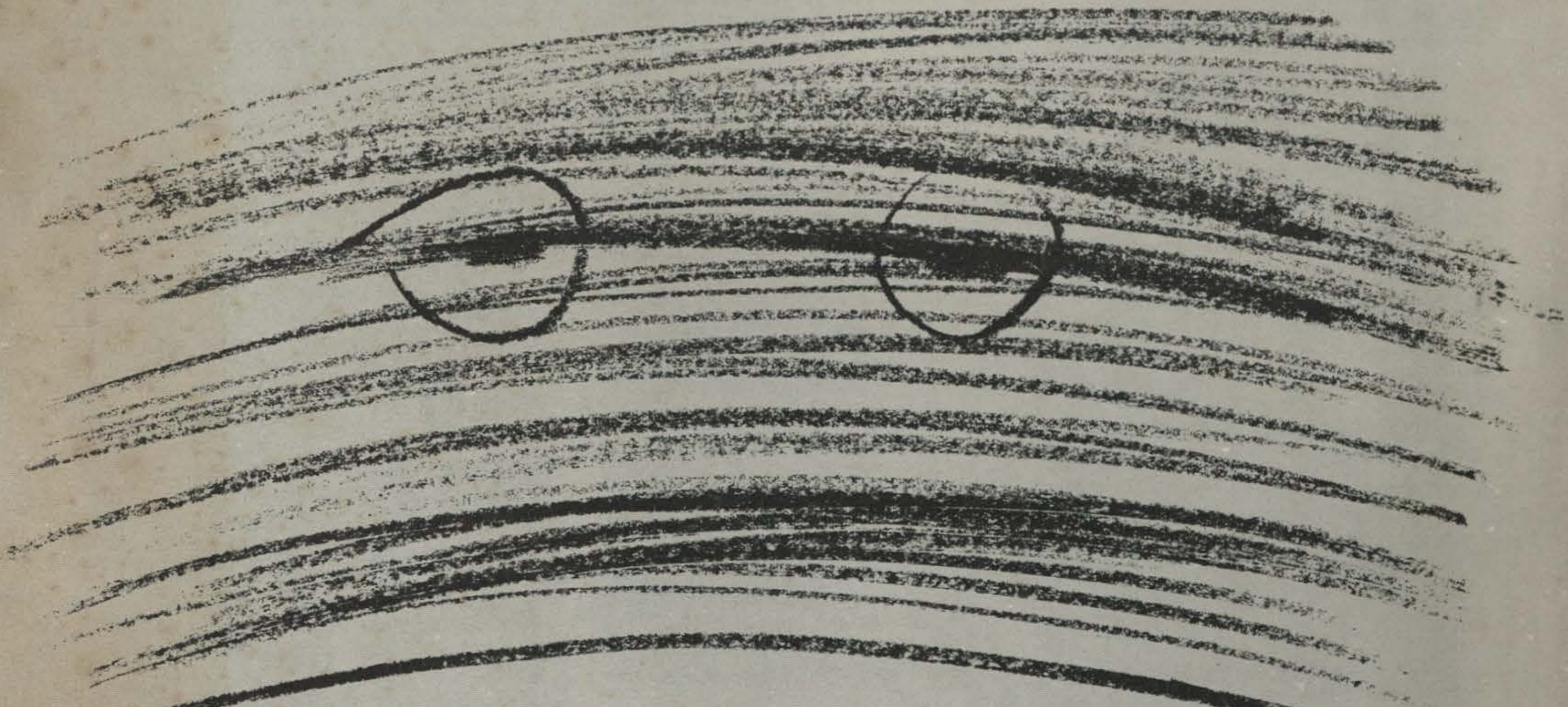

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